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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,607	07/22/2003	Delphine Charlet	324-157	5066
22429	7590	08/22/2007	EXAMINER	
LOWE HAUPTMAN HAM & BERNER, LLP			RIDER, JUSTIN W	
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SUITE 300			ART UNIT	PAPER NUMBER
ALEXANDRIA, VA 22314			2626	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/623,607	CHARLET, DELPHINE	
	Examiner	Art Unit	
	Justin W. Rider	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 08 June 2007.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-20 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

- Certified copies of the priority documents have been received.
- Certified copies of the priority documents have been received in Application No. _____.
- Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) Notice of Informal Patent Application
6) Other: _____.

Response to Amendment

1. In response to the Office Action mailed 08 March 2007, applicant submitted a response filed 08 June 2007, in which the applicant amended claims 1-2 and 5-6 without adding new matter. Claims 11-20 have been added.

Response to Arguments

2. Applicant's arguments filed 08 June 2007 have been fully considered but they are not persuasive. Regarding the remark concerning the rejection of claim 1, the Office Action does not rely on column 5, line 65-column 6, line 5 of **Roberts**; on the contrary, it merely includes language that supports the teaching cited by the Examiner in the Office Action regarding speech template updating. In the Office Action, the Examiner cites column 5, lines 36-44 as explicitly teaching on the updating of speech template parameters based on the result that an input utterance is *at least* above an acceptance threshold. Once again, the Examiner was using the teachings from column 5, line 65 - column 6, line 5 as a further explanation of the fact that a threshold is corresponding to an acceptance and/or rejection level. Therefore, the Examiner asserts that **Roberts** does, in fact teach the claimed limitations as presented in the previous Office Action.

Further, the Examiner was aware of the fact that **Reynolds** is Applicant admitted prior art that did appear in Applicant's specification. However, this has no bearing on the fact that $\Lambda(x)$ is a log domain or normalized variation of equation (5) as presented on page 95 of **Reynolds**. Further, the Examiner is confused as to where the language concerning *two* normalization parameters is located in Claim 1 (Remarks, p. 11, ln. 4). The mere mention of at least one

normalization parameter is compared to two (acceptance and rejection) thresholds. The normalized (log domain) likelihood score represents one of a normalized verification score that is used in the determination of speaker acceptance. While **Reynolds** teaches the use of two models being simultaneously used in normalization, it is **Roberts**, not **Reynolds** that explicitly teaches the modification, testing or updating of speech acceptance templates only if said input utterances are above a certain acceptance threshold.

One of ordinary skill in the art would be compelled to combine the two references because while **Roberts** teaches the use of speaker template models to either accept or reject a users' input utterance, **Reynolds** attempts to solve the same problem using an analogous solution that goes one step further by combining the two models for a predictable result that could be commonly implemented within the speech recognition art.

Regarding Claim 2, **Roberts**, teaches 'feature extraction algorithms that create a standard set of parameters for each sample, and maintain a template that consists of the "average" set of parameters for all samples, and where it is easy to modify the template by (for example, recomputing a mean) using only the parameters and not having to redo the signal processing for all of the original samples.'

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Roberts et al.** (**USPN 6,119,084**) referred to as **Roberts** hereinafter in view of **Douglas A. Reynolds**, ‘**Speaker identification and verification using Gaussian mixture speaker models**’ referred to as **Reynolds** hereinafter.

Claims 1, 12 and 18: **Roberts** discloses an apparatus, method and device for adaptively recognizing and verifying a speaker, comprising:

- i. means for generating beforehand, during a learning phase, parameters of an acceptance voice model relative to a voice segment spoken by said authorized speaker and parameters of a rejection voice mode (col. 5, lines 45-62); and
- ii. means for updating at least one of said normalization parameters as a function of a preceding value of said one normalization parameter and the speaker verification score on each voice segment test only if the normalized verification score is at least equal to a second threshold that is at least equal to said first threshold (col. 5, lines 36-44, wherein the model (template) is updated if a [normalized speaker verification] score crosses a second acceptance threshold that is *at least* equal to a first rejection threshold (col. 5, line 65- Col. 6, line 5)).

Roberts discloses the use of an acceptance model threshold to either accept or reject an input voice utterance, although failing to, but **Reynolds** does, disclose the use of both an acceptance model and a rejection model (Page 95, section 3.3, referring to H_0 and H_1), which can be commonly thought of as a garbage model within speech or voice recognition. Also, on Page 95, **Reynolds** teaches the utilization of a normalized score ($A(X)$) based on the likelihood ratios involving both the acceptance and rejection models. On Page 96, **Reynolds** continues by

disclosing thresholds in relation to the aforementioned score to either accept or reject an input utterance as a registered user.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Reynolds** in the device of **Roberts** because the combination of a mixture of models that determine not only if the utterance is acceptable, but also if the system is relatively certain that the utterance is not one of a registered user both increases the amount of correct decisions (accept the acceptable and reject the non-acceptable).

Claims 2 and 14: **Roberts** discloses an apparatus and device as per claims 1 and 12, wherein one of said updated normalization parameters updated is representative of a statistical mean value of the speaker verification score (col. 7, line 55-col. 8, line 5). **Roberts** discloses wherein a mean or average of the speaker template is maintained and updated as being a representative ‘score’ of the overall speech template or model.

Claims 11, 13 and 20: **Roberts** discloses an apparatus, method and device as per claims 1, 12 and 18 above, and implicitly teaching wherein the second threshold exceeds the first threshold. **Roberts** discloses (col. 5, line 36 - col. 6, line 5) wherein there is a first threshold (‘Reject’), which is lower than a second threshold (‘Accept’).

5. Claims 3-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Roberts** in view of **Reynolds** as applied to claims 1-2 above, and further in view of **Viikki et al.** ‘**A recursive feature vector normalization approach for robust speech recognition in noise**’ referred to as **Viikki** hereinafter.

Viikki discloses a system of normalizing vectors representing parameters in speech recognition. Where **Roberts** does disclose the use of statistical methods to update parameters (see above claim 2), **Roberts** fails to completely describe the methods of performing them. **Viikki** teaches a set of feature vectors (parameters) that is used to compare an input signal when attempting to recognize input speech. The model in this case is adaptively updated for every incoming frame. This method provides environment-independent parameter statistics (Abstract). These updating methods for mean and standard deviation are well-known methods for the use of updating parameters with respect to changing conditions, such as slight changes in a speaker's voice or background noise. It is noted that while other prior art references use mean and standard deviation to update *utterance* parameters, **Viikki** clearly discloses the steps of performing the determination and updating of *speech model* parameters using both mean and standard deviation.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Viikki** in the device of **Roberts** and **Reynolds** because other methods have become unreliable and the determination of a variance of a current parameter value with respect to the mean of prior parameter values is an effective way to incorporate the amount of variation into the previous value and therefore provide a very robust recognition and verification system (**Viikki**, p. 733; Introduction).

Claims 3-4: **Roberts** and **Reynolds** disclose the device as per claim 2 above however failing to, but **Viikki** does, specifically disclose wherein said statistical mean value $\tilde{\mu}_\lambda$ of the speaker verification score S_V is updated in accordance with the following relationship:

$$\tilde{\mu}_\lambda \equiv (1 - \tau_\mu) \tilde{\mu}_\lambda + \tau_\mu \cdot S_V$$

in which τ_μ is a predetermined adaptation factor (page 734, section 2.1, eqn. (4)). The applicant's adaptation factor as well as the step-size parameter of **Viikki** are both convergence factors and are updated with respect to the number of updating iterations in order to provide a rapid convergence to the desired model. For practical purposes, the adaptation factor is equivalent to the step-size parameter, λ , within the context of art-related converging parameters.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Viikki** in the device of **Roberts** and **Reynolds** for the reasons outlined above.

Claims 5-7 and 15: **Roberts** and **Reynolds** disclose an apparatus and device as per claims 1 and 12 above however failing to, but **Viikki** does, specifically disclose wherein the standard deviation [spread] is used (page 734, section 2.1) and wherein said standard deviation $\tilde{\sigma}_\lambda$ of the speaker verification score S_V is updated in accordance with the following relationship:

$$\tilde{\sigma}_\lambda \equiv \sqrt{(1 - \tau_\sigma) \tilde{\sigma}_\lambda^2 + \tau_\sigma (S_V - \tilde{\mu}_\lambda)^2}$$

in which τ_σ is a predetermined adaptation factor (page 734, section 2.1, eqn. (5)). The adaptation factor is equivalent to the step-size parameter, λ that is an art equivalent factoring parameter used in the update of the standard deviation.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Viikki** in the device of **Roberts** and **Reynolds** for the reasons outlined above.

Claims 8, 16 and 19: Claims 8, 16 and 19 are similar in scope and content of claim 1; therefore claims 8, 16 and 19 are rejected under the same rationale.

Claims 9 and 17: **Roberts** and **Reynolds** disclose the apparatus and device as per claims 8 and 16 above however failing to specifically disclose wherein model parameters are updated using the following equation:

$$m = \frac{N_{AP}m_{AP} + N_{adapt}m_{adapt}}{N_{AP} + N_{adapt}}$$

Viikki discloses the claimed invention except for what would have been obvious to one having ordinary skill in the art at the time the invention was made; and the examiner takes Office Notice of the equivalence of using an arithmetic mean as a recurrence equation for its use in the art and the selection of any of these known equivalents to determine a value of a parameter with respect to previous data in a series and updated information, which would be well within the level of ordinary skill in the art.

Claim 10: **Roberts** and **Reynolds** disclose the device as per claim 1 above however failing to, but **Viikki** does, specifically disclose wherein the score is normalized using the following equation:

$$s_N = \frac{s_V - \tilde{\mu}_\lambda}{\tilde{\sigma}_\lambda}$$

with the known parameters representing both mean and standard deviation (page 734, eqn (3)).

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin W. Rider whose telephone number is (571) 270-1068. The examiner can normally be reached on Monday - Friday 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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08 August 2007


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